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ABSTRACT

This document contains twenty recommendations put forth at the Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere under the direction of UNESCO (United Nations Educational, Scientific and Cultural Organization). The conference was held at the UNESCO House, Paris, France, September 4-13, 1968. The recommendations are entitled: (1) International Research Programme on Man and the Biosphere, (2) Research on Ecosystems, (3) Research on Human Ecology, (4) Inventory and Monitoring of Resources, (5) Methodology and Co-ordination of Research, (6) Pollution Research and Mcnitoring, (7) Utilization and Preservation of Genetic Resources, (8) Rational Use of Natural Resources, (9) Training at the Primary and Secondary School Level, (10) Teaching of Ecology at University Level, (11) Centers for Training and Research in Rational Use and Conservation of the Resources of the Biosphere, (12) Out-of-School Environmental Education of Youth and Adults, (13) Inter-Agency Co-ordination on Environmental Education, (14) Science and Resource Policy, (15) Preservation of Natural Areas and Endangered Species, (16) Multidisciplinary Research and Training Centers for Resource Inventory and Evaluation, (17) United Nations Conference on Human Environment, (18) Technical Assistance for Basic and Applied Studies on the Resources of the Biosphere, (19) Rational Use and Conservation in Assistance Projects for Developing Countries, and (20) Preparation of an Intergovernmental Interdisciplinary Programme. [Not available in hardcopy due to marginal legibility of original document.] (BL)

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UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

INTERGOVERNMENTAL CONFERENCE OF EXPERTS ON THE SCIENTIFIC BASIS FOR RATIONAL USE AND CONSERVATION OF THE RESOURCES OF THE BIOSPHERE

Unesco House, Paris, 4 - 13 September 1968

RECOMMENDATIONS

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Biosphere Conference

RECOMMENDATION 1

INTERNATIONAL RESEARCH PROGRAMME ON MAN AND THE BIOSPHERE

The Conference,

Recognizing man's rôle in developing and utilizing the resources of the biosphere for human welfare, through his activities in agriculture, forestry, medicine, and exploitation of aquatic resources;

Noting that the technological developments of man as shown by his achievements in industry, transport, communications and urbanization, all of which are essential aspects of human welfare, have nevertheless resulted in major problems of pollution: the carbon dioxide balance in the atmosphere is being altered and a variety of pollutants, including radio-active materials and a wide range of toxic chemicals, is being added to the biosphere;

Stressing that improvement of the human condition has been very largely achieved on a pragmatic basis aimed at obtaining immediate benefits, without sufficient consideration or even understanding of the long-term environmental consequences and their implications to human health and well-being, and that these consequences, such as the deterioration of terrestrial and aquatic environments, changes of water balance, loss of plant and animal species, are all results of this immediate, success of human activities in exploitation as is the most significant consequence of this success, the tremendous expansion in the human population;

Emphasizing that there are very special problems associated with developing countries where there are urgent and rapidly increasing demands to utilize the natural resources to the fullest extent, to provide an adequate standard of living for all inhabitants, and where, because modern technologies will have to be applied on a major scale, it is important to plan carefully, so as to maximize the benefits and to avoid the deleterious effects that have been produced in the past;

Further recognizing that many of the changes produced by man affect the biosphere as a whole and are not confined within regional or national boundaries, and that these problems cannot be solved on a regional, national or local basis, but require attention on a global scale;

Stresses also that these factors have created a situation which is becoming increasingly perilous, and which, if allowed to continue, may produce an extremely critical situation that could seriously harm the present and future welfare of mankind, and become irreversible unless appropriate actions be taken in due time;

Invites the Member States, intergovernmental organizations, particularly the United Nations through its General Assembly, and non-governmental organizations, to take cognizance of this situation and take appropriate action at national, regional, and international levels;

Further notes that, although there is much scientific information which can be immediately applied to many of the problems of the biosphere, there is urgent need for an expansion of relevant research on a global scale;

Consequently recognizing the multidisciplinary nature of the problems of the biosphere involving not only biological and physical sciences but also social sciences; and that it is therefore necessary to call on the various disciplines of the scientific community to concentrate on environmental problems;

Noting the valuable start and precedent in this direction made by several non-governmental organizations, particularly the International Biological Programme (IBP) initiated by the International Council of Scientific Unions (ICSU), and the International Union for Conservation of Nature and Natural Resources (IUCN); but recognizing that while these efforts are world-wide in scope, the capabilities of such non-governmental activities are necessarily limited, and that at the conclusion of the IBP in 1972 many problems of the biological basis of productivity and human welfare will have been defined and partially explored but few will have been studied to conclusion;

Draws the attention of Member States, intergovernmental and non-governmental organizations to the importance of continued and increased support for IBP and IUCN;

Suggests that IBP might usefully be followed by an international programme of expanded and strengthened research, education and implementation on the problems of man and the biosphere, based on intergovernmental and governmental recognition and support, and on the participation of relevant non-governmental international scientific organizations;

Recommends that Unesco, in co-operation with all organizations concerned, should, without delay, set up suitable working groups, including in particular representatives of the appropriate intergovernmental organizations and governmental and non-governmental scientific bodies, to prepare a plan for submission to Member States to implement the above recommendation.

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RECOMMENDATION 2

RESEARCH ON ECOSYSTEMS

The Conference,

Considering that the renewable organic resources of the biosphere are produced within functional entities, the ecosystems, in which living organisms and physical factors of the environment react upon one another;

Bearing in mind the very great diversity of the ecosystems and the considerable inequality of their production potential;

Recommends that Unesco, in collaboration with other intergovernmental and non-governmental organizations concerned, should prepare a plan for a world programme of ecological, ecophysiological and bio-climatological research on a range of ecosystems, both natural and semi-natural, artificial or cultural, on land and in water, selected from both temperate and tropical zones, in wet or arid countries, in order to determine the potentialities of the zones studied and thus obtain an estimate of the renewable organic resources of the biosphere.

Further recommends that such a plan takes into account the following aspects:

1. The global and the analytic study should be conducted simultaneously. The global study should reveal the nature of the ecosystem as a functional entity, showing the part played by the different factors involved in the functioning of the global ecosystem complex. It should include an evaluation of the plant and animal biomass, its variation in time and of primary and secondary production. The analytical study should include research on the process of energy conversion within the ecosystem, particularly at the photo-synthesis level and at the passage between trophic levels. It should establish the role played by the different organisms in the transfer and transformation of energy and matter. The response of ecosystems to external influences, such as management, should be studied.

2. In all regions of the world, this research should turn upon a minimum programme comprising all or part of the global study.

3. In regions where this is possible, this programme could be extended and regarded as "advanced" or "optimal" as soon as it includes the following topics: definition of water cycles and major or minor mineral elements, the biology of the sub-stratum, the ecophysiology and genetics of the most representative species, research into all the conditions favouring the growth of chlorophyll-containing plants, including the symbiotic fixation of the nitrogen in the air which, with other stimulants, is likely to increase the overall yield of ecosystems, both terrestrial and aquatic, and therefore, agricultural, pastoral, forestry and fishery productivity.

4. Research into the working of ecosystems calls for the training of teams of physicists, physiologists, experimental biologists, taxonomists, soil scientists, micro-biologists and micro-meteorologists and for the development of methods and models specially adapted to such research.

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RECOMMENDATION 3

RESEARCH ON HUMAN ECOLOGY

The Conference,

Considering that man is an integral part of most ecosystems, not only influencing but being influenced by his environment; that his physical and mental health, now and in the future, are intimately linked with the dynamic system of natural objects, forces and processes that interact within the biosphere and including also those of man's culture;

Recommends to the Member States and their appropriate institutions, to Unesco, WHO and the international organizations concerned:

1. That research be directed to man's basic ecology and to his social and physical adaptability to the changes of all kinds to which he is being subjected, whether in simple or in more complex societies, including those that are highly technological and urbanized;

2. That continuing and intensified research be undertaken on the ecology of human diseases, with special reference to those associated with environmental change and to the zoonotic diseases arising from interactions between man and animals;

3. That this research be directed at solving increasingly important problems of the establishment of the necessary balance between man and his environment in relation to the maintenance of his health and well-being in their broadest connotations.

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RECOMMENDATION 4

INVENTORY AND MONITORING OF RESOURCES

The Conference,

Recognizing that planning for rational use and conservation of resources at any level of organization requires precise knowledge of resource quality and availability, and that long-term balanced planning further requires knowledge not only of the present status of and requirements for the resources involved, but of the trends (i.e. whether increasing or decreasing) and in some cases, of the potential, and that such information can be obtained only through well planned programmes of resource inventory and monitoring and associated research designed to provide information for specific and well-defined purposes and requirements, and

Noting that there are a number of international arrangements for describing, evaluating and mapping natural resources, but that methods used are not in all cases standard throughout the world, and problems of comparability of data make regional or international assessments difficult;

Draws attention of Member States, intergovernmental organizations, and non-governmental scientific organizations as appropriate, to the need for attaining an increased uniformity of procedures for data-collection and data-recording, including mapping, particularly among similar ecosystems in different parts of the world, for both scientific and comparative planning purposes;

Suggests that a first step in the development of an inter-comparable international system might involve an inventory and evaluation of the existing structures, methodologies and data. Appropriate existing activities could be continued and strengthened and appropriate existing materials could be utilized in the further development of comparable monitoring and evaluation methodology;

Recommends that Unesco, in co-operation with other intergovernmental and non-governmental organizations concerned, take the necessary steps for including the following specific requirements:

1. Definition of the resources to be involved, and establishment of priorities

2. Determination of the objective and function of the operation for each resource (i.e. what is the purpose of the survey, inventory, or monitoring operation)

3. On the basis of the function and objective of the operation, determination of the most effective methodology both for obtaining data and for

recording and disseminating it; agreement upon standardization of the methodolcgy to assure compatibility and comparability; determination of necessary levels of accuracy and consequent sampling intensity

4. Dissemination of the resultant data in forms usable to scientists and to planners in the development of bases for rational use of resources. This applies both to commodity resources, such as types of timber and food products; and to non-commodity resources, such as natural areas or research reserves to preserve scientifically adequate examples of the world's habitat types and endangered species of flora and fauna.

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RECOMMENDATION 5

METHODOLOGY AND CO-ORDINATION OF RESEARCH

The Conference,

Recalling that the proposed intensification of research on ecosystems in general, as well as the inventory and monitoring of resources, has to be supported by an appropriate development and standardization of methods of study;

Bearing also in mind the need for storage, communication and elaboration of a large amount of information;

Recommends to Member States, intergovernmental organizations, and non-governmental organizations concerned that the necessary steps be urgently taken for:

1. Standardizing and intercalibrating of methods of study, where the methods are considered satisfactory and standardization is not otherwise assured;

2. Increasing the number and quality of recording stations, for a number of selected parameters, such as radiation;

3. Developing new methods for surveying and monitoring, including the full use of the possibilities offered by modern technology, such as remote sensing;

4. Creating and supporting on a multi-country basis the appropriate data centres for storage and retrieval of information on representative types of natural, semi-natural and man-made ecosystems;

5. Developing acceptable and standardizable procedures for the typification and classification of complex entities (e.g. soils, ecosystems) in co-operation with and assisted by appropriate scientific agencies and organizations already in existence;

6. Ensuring the involvement of mathematicians, systems-analysts and other appropriate specialists in studies of ecosystems, in recognition of the importance of sound mathematical concepts at all stages of research, including design, conduct, and analysis; and of developing models for the deeper understanding of the functioning of ecosystems and for predicting the consequences of change.

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RECOMMENDATION 6

POLLUTION RESEARCH AND MONITORING

The Conference,

Recognizing that pollution of the biosphere, involving products of, or associated with, combustion, other substances and conditions, is becoming an increasingly serious problem, directly or indirectly affecting the health and well-being of humans as well as other organisms;

Recognizing that certain pollutants may be transported over large distances, particularly in air and water, and produce undesirable effects in places remote from the source of pollution;

Recognizing also that some long-lasting pollutants may persist in the biosphere in time and space, far from their point of origin, gradually accumulating to the point where they reach dangerous levels;

Recognizing further that changes in technology, increasing industrialization and the development and use of new chemicals, particularly pesticides and fertilizers, are constantly introducing new substances into the biosphere or changing their distribution, and that research is needed to determine the physiological, toxic and ecological effects of these introductions;

Recognizing further that the problem of pollutants demands monitoring on a world-wide basis and that emphasis should be placed on the need for increased intergovernmental co-operation of monitoring services;

Recognizing further the desirability of supporting, expanding and co-ordinating the monitoring services for environmental pollution in most European and several other countries, and the need to develop such services in those countries where they do not yet exist;

Recommends that Unesco, WHO, FAO, WMO and other intergovernmental or non-governmental organizations concerned, promote a research programme along the following lines:

1. Definition and identification of actually or potentially involved substances and conditions including those associated with combustion and the break-down products of these substances and, as appropriate, determination of priorities among them for research and monitoring;

2. Development of uniform terminology and monitoring methods, leading to internationally compatible data and techniques which form the basis of world-wide monitoring in air, soil, water and living organisms. This will include attention to remote sensing, direct sampling, methodology of analysis, standardization of measurements, etc., and should be based upon and make fullest use of the existing monitoring systems and other appropriate structures and activities of international agencies and Member States.

3. Determination of levels of contaminants or pollutants dangerous or critical to other components of the environment in general, and to human welfare in particular, either directly or through long-term accumulation of low-level toxicants; determination of the subsequent formulation of water quality criteria or desirable standards for all uses of water; research and surveillance, directed towards new substances or conditions actually or potentially dangerous;

4. Studies of the movement and degradation of pollutants through the environment, and determination of necessary levels of sampling and consequent numbers and locations of monitoring stations required for different substances and conditions;

5. Research into methods: (a) to prevent, control, or avoid introduction of these substances into the environment; (b) to analyse their dispersion and accumulation; (c) to reduce their level; and (d) to mitigate their deleterious impact;

6. Where possible, prior to introduction of new chemicals or conditions, measurements should be made to establish the values of relevant parameters against which to measure their developing effects, and to support control regulations;

7. Development of effectively safe means of transporting potentially toxic substances and pollutants to avoid accidental discharge;

8. Research into the potentially dangerous effects of food additives and means to achieve satisfactory reduction or elimination of those determined to be deleterious in human and animal foods;

Further recommends:

1. That scientists and technologists in all Member States be encouraged to co-operate in the measurement of existing levels of physical, biological and chemical parameters in order to make it possible to evaluate changes in the environment, such as levels of concentration and patterns of distribution of pollutants;

2. That the United Nations Specialized Agencies and their appropriate consultative bodies be asked to assist Member States in examining their existing programmes and in redirecting, where feasible within existing resources, programmes to accomplish this purpose;

3. That Member States and non-governmental organizations encourage research activity, and ensure co-operation amongst scientists in the continuous quantitative measurements outlined in this recommendation.

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RECOMMENDATION 7

UTILIZATION AND PRESERVATION OF GENETIC RESOURCES

The Conference,

Recognizing that only a very small number of the very numerous plant and animal species are directly utilized by man as a result of cultivation and domestication, and that a limited number of other species attract his attention and interest;

Noting that there is a widespread and growing interest and activity in enriching the genetic resources of organisms useful to man through selection of new forms from wild strains, hybridization and production of mutants derived from chemical and physical action;

Taking into account the accelerating rate of species extinction, and the fact that others are becoming rare and threatened, largely because of the destruction of suitable habitats for them;

Suggests that special efforts must be taken urgently to preserve the rich genetic resources that have evolved over millions of years and are now being irretrievably lost as a result of human actions, and that these efforts must include:

1. Preservation of representative and adequate samples of all significant ecosystems in order to preserve the habitats and ecosystems necessary for the survival of populations of the species;

2. Establishment of special protected areas in regions where long-domesticated species of plants and animals thrive in their original habitat;

3. Strenuous efforts to protect the remnant populations of rare and endangered species of plants and animals and to provide the care and conditions necessary for increase of their numbers, their selection and their improvement;

4. Increase and improvement of actual collections of germinal plant plasm;

5. Establishment and care of numerous species, varieties and strains of long-domesticated kinds of plants, such as cereals, and animals, such as cattle, in living collections so that the rich variety of their genes will not be forever lost because of the present tendencies in agriculture and animal husbandry to concentrate on a limited and highly selected array of strains;

Recommends that Member States, Unesco, FAO and other interested international organizations concern themselves with these facts and take vigorous steps to preserve the heritage of genetic resources which, if lost, can never be recovered.

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RECOMMENDATION 8

RATIONAL USE OF NATURAL RESOURCES

The Conference,

Stressing the urgent problems posed by the destruction and degradation of natural resources due to ever-increasing pressure of the expanding technology and human population on the environment;

Emphasizing the need to promote rational use of the resources based on scientific research;

Noting that the development programmes carried out throughout the world often do not sufficiently take into consideration the ecological aspects of the problems, so that they result in significant unintended alterations of the environment;

Recommends that Unesco and the other international and non-governmental organizations concerned, prepare a research programme with the object of acquiring the basic scientific knowledge for rational use of resources and which should include:

1. Analysis and possibility of choice in integrated use of natural resources to ensure the permanence of the biosphere, in connexion with terrestrial and aquatic ecosystems and with regard to:

   (a) identification of the different resources, with special reference to water and soil, from the point of view of their various values for use (economic, scientific, recreational, aesthetic, educational);

   (b) evaluation of the possibilities of using these resources, under varying climatic conditions, based on their characteristics and on the social and economic factors involved in their use;

   (c) multi-purpose use

2. Study of the rational use of resources, particularly water and soil, with special reference, as regards water:

   to its use in agricultural ecosystems, to the use of saline water in ecosystems to which it can be applied, to the control of evapotranspiration both from soils and from open water surfaces and to its rôle of essential component of the habitat of aquatic species;

   and, as regards soil:

   to the influence of soil characteristics on the choice of use, to the possibilities of improving fertility and productivity, to the

problems raised by the transition from shifting to intensive cultivation, mainly in tropical zones, to the restoration of degraded and saline soils; and lastly, to the deterioration due to fire and accelerated erosion, particularly in the tropical zone and in mountain areas.

3. Study of the rational use of plant and animal resources both terrestrial and aquatic, with regard to:

the increase of primary production (optimization of environmental conditions, reduction of losses, introduction of exotic species), the increase of secondary production including utilization of non-domesticated species, domestication, improvement of the quality of production, and the restoration and enhancement of the quality of the environment, and the management required to achieve the above objectives.

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RECOMMENDATION 9

TRAINING AT THE PRIMARY AND SECONDARY SCHOOL LEVEL

The Conference,

Considering that there is insufficient provision for ecology in the curricula for biology and related sciences, and that there is a lack of knowledge of ecology among primary and secondary school teachers, and that ecological thinking is a necessary ingredient in instruction,

Recognizing the special importance and need for sound environmental education at these levels, both in terms of providing general student awareness and as a basis for eventual specialist training,

Being aware of the pressing need for appropriate educational materials and curricula at these levels,

Recommends to Member States that their national authorities and educational organizations engage in:

1. the revision of curricula so that environmental education be introduced, improved or extended in biology and also incorporated into the teaching of other subjects;

2. the training of a core of teachers in ecology which would provide leaders in this field;

3. the organization of workshops or seminars or other similar training activities for teachers who are responsible for environmental education;

4. the posting of experts from Unesco and other United Nations and international organizations concerned, to assist projects to help the training of teachers in developing countries, by working with local counterpart staff, and to provide funds to support such projects.

Recommends that Member States make every effort in setting up or improving environmental education at the primary and secondary school levels, by collecting, producing and disseminating a comprehensive range of suitable educational aids (including textbooks, regional ecological studies, film-strips, teachers' guides and similar materials), and

Recommends that Unesco and other United Nations and international organizations concerned should assist these activities by helping to provide materials, information, advice and expert assistance, and by keeping Member States informed of national and regional developments in this field.

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RECOMMENDATION 10

TEACHING OF ECOLOGY AT UNIVERSITY LEVEL

The Conference,

Considering that there is an urgent need for ecologically oriented specialists,

Recommends to Member States and their institutions of higher education:

1. the introduction or extension of an ecological approach into the university courses, at all levels, including post-graduate, short-term and any other special courses, in the training of professionals such as teachers, biologists, agriculturalists, foresters, health workers, engineers, architects, economists, sociologists and all specialists who play any part in the use and conservation of the resources of the biosphere;

2. the training of professional environmental scientists and technologists through the establishment of university chairs and institutes for environmental studies and conservation, and

3. the review, and, where necessary, the improvement of all existing and proposed measures for the collection, retrieval and dissemination of information relating to environmental education

Recommends that Unesco, in cooperation with FAO and other United Nations organizations, international organizations and non-governmental organizations as well as regional organizations concerned, assist in these activities with experts and funds.

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RECOMMENDATION 11

CENTRES FOR TRAINING AND RESEARCH IN RATIONAL USE AND CONSERVATION OF THE RESOURCES OF THE BIOSPHERE

The Conference,

Considering

1. that the training of leaders in rational use and conservation of the resources of the biosphere, capable of intervening in the policy and decision making of their country, is of greatest urgency;

2. that such training must preferably be done at centres adequately staffed and equipped and located in areas that duplicate as much as possible the ecological, cultural (including linguistic) and economic conditions of the country of origin of the trainees;

3. that such training is costly and that these centres be used as efficiently as possible, by combining training with research, documentation and other related activities;

Recommends to Member States, to United Nations organizations and to regional organizations

1. that existing interdisciplinary national and international training and research centres which at present deal with the broad field of rational use and conservation of the resources of the biosphere, be strengthened in staff, facilities and fellowships to make possible a strong programme of training and research in ecology and related environmental aspects;

2. that new centres be established within appropriate regions, where they do not exist already;

3. that co-ordination of these centres with counterparts from other Member States or regions of the world be established so as to allow the maximum of free flow of staff and information and the minimum of wasteful duplication.

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RECOMMENDATION 12

OUT-OF-SCHOOL ENVIRONMENTAL EDUCATION OF YOUTH AND ADULTS

The Conference,

Recognizing

1. the urgent need to help all sections of the community to understand the broad ecological principles involved in man's use of natural resources and the interactions that exist between man and his physical and biological environments, and

2. the desirability of increasing public awareness concerning the biological and historical perspectives of mankind's position in relation to the biosphere and the concept of the partnership of man with other living beings,

Recommends that Member States should fully engage the resources of mass media and also use and develop information centres, parks, museums, zoological and botanical gardens, field stations and nature reserves, in order to educate children, adolescents and adults in environmental biology and make them aware of their environmental heritage

Recommends further that Unesco and other U.N. organizations as well as international organizations concerned, should be prepared to assist Member States by helping provide the advice, equipment and expert staff which may be needed in the operation of these programmes of community education.

Such programmes of community education, bearing in mind the special requirements of communities of differing educational standards, traditions, language, cultural backgrounds, should:

1. Include the preparation and distribution of publications and visual aids;

2. Make provision for special incentives (e.g. honours, prizes and public recognition) for those members or sections of the community who achieve distinction in either the production of popular educational material (by scientific writing, journalism, film making, travelling exhibits and related activities), or the survey, care and development of environmental projects;

3. Encourage the special participation in environmental projects of existing youth and social groups and associations;

4. Encourage the participation of youth in out-of-school environmental education programmes;

5. Integrate formal school environmental education with out-of-school youth programmes.

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RECOMMENDATION 13

INTER-AGENCY CO-ORDINATION ON ENVIRONMENTAL EDUCATION

The Conference,

Recommends that Unesco explore urgently, in consultation with U N, FAO, WHO, WMO, ILO, IUCN and ICSU, the means of serving, on a continuing basis, the following educational needs:

1. Extending existing liaison arrangements;

2. Reviewing existing programmes and proposals;

3. Identifying the changing needs in education and specialist training, and establishing priorities for action;

4. Recommending the division of responsibilities among the organizations concerned with regard to programme activity;

5. Recommending areas of action and specific projects which should be the subject of joint action by two or more of the relevant organizations. These projects might include the provision of common services in the preparation and distribution of educational materials through the various channels already available to the organizations.

Further recommends that attention be given to [illegible] appropriate administrative arrangements for such purposes, including possibly the constitution of a permanent inter-agency working group.

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RECOMMENDATION 14

SCIENCE AND RESOURCE POLICY

The Conference,

Considering that rapid developments occurring in all countries threaten destruction of certain resources of the biosphere and that development of one resource frequently has deleterious effects on other resources, effects which are not recognized when plans are formulated and policies established;

Further considering that maintenance of the total environment is often neglected in connexion with land use, development of water resources and waste disposal procedures, and that in other situations the complex interactions are not readily evident to those who establish policy,

Recommends that Member States and governing bodies of all United Nations organizations develop comprehensive and integrated policies for management of the environment, and that international efforts and problems be considered in the formulation of such policies.

Such policies should include:

1. Inventory of natural resources as a basis for the determination of priorities taking into account the existence of areas particularly endangered and provision for periodic review of priorities for exploitation depending upon technological and economic changes;

2. Management and utilization of natural resources in the most economical manner taking into account the repercussions of utilization of a particular resource on other resources and on the environment as a whole. Such ecological concepts should be applied in the planning at national and local levels;

3. Optimal productivity consistent with continued utilization of the biosphere on a long-term basis;

4. Recognition of the possible multiple use of resources;

5. A comprehensive and integrated research programme covering all the aspects of the management of water, soil and biotic resources, including research on socio-economic factors;

6. The application of science and technology to the management of the environment;

7. Provision of an appropriate mechanism that will assure that the best possible advice from specialists of biological, physical and social

sciences, technology and economics is available on a regular basis to the authorities at all levels responsible for decision-making concerning all aspects of environmental management and utilization;

8. The establishment of an appropriate structure and mechanism to assure periodic and comprehensive review of policy and with authority, responsibility and resources to readjust guidelines and goals and to make deletions, revisions, and realignments in action programmes, based upon empirical experience, scientific and technological advance, and changes in national or world conditions;

9. A programme of education and information for the general public covering the principles and importance of environmental management while avoiding completely theoretical statements and emotional appeals in contacts with the public.

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RECOMMENDATION 15

PRESERVATION OF NATURAL AREAS AND ENDANGERED SPECIES

The Conference,

Noting that increasing human populations and development activities make the selection and preservation of representative examples of biotic communities and endangered species imperative, and that throughout the world increasing numbers of plant and animal species are in grave danger of extinction as a consequence of direct actions against them and of indirect destructive influences on their indispensable habitats;

Realizing that the extinction of species and the total destruction of certain communities represent an irreparable loss, considering their economic, scientific, educational and aesthetic values for Man;

Recognizing that the International Union for the Conservation of Nature, the International Biological Programme, and other organizations and agencies, both national and international, are working on these problems;

Recommends that all such bodies, public and private, make strenuous efforts to establish natural areas for the preservation of species, their habitats and representative samples of ecosystems; and

Recommends that Member States accelerate the establishment and protection of national parks and wild-life sanctuaries, that they encourage their local administrations and private citizens to take appropriate local action, and that they themselves undertake and encourage scientific research and education in support of these important activities;

Further recommends that the developing countries receive, in this respect, appropriate assistance.

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RECOMMENDATION 16

MULTIDISCIPLINARY RESEARCH AND TRAINING CENTRES FOR RESOURCE INVENTORY AND EVALUATION

The Conference,

Drawing the attention of Member States to the importance of multidisciplinary centres for research and training on the environment and its resources at both the national and local levels, if the complex problems of the management of resources of the biosphere are to be satisfactorily studied;

Considering that such institutions could of course be established in a number of different ways according to the existing institutional structures of countries, to the particular ecological conditions, to the actual needs for inventory, evaluation and management of resources and to the particular situation as regards qualified personnel;

Further considering that the need for expanded interdisciplinary activities appears desirable to all countries;

Urges Member States to give attention to this need in the development of their scientific structures, especially in relation to planning the development of the resources of their territories;

Recommends that the United Nations organizations concerned assist in the planning and establishment of such institutions in the many countries, especially developing ones, where the scientific structures are not yet sufficiently strong to meet these needs.

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RECOMMENDATION 17

UNITED NATIONS CONFERENCE ON HUMAN ENVIRONMENT

The Conference,

Being informed that the Economic and Social Council of the United Nations (ECOSOC) at its forty-fifth session approved a resolution on the question of convening an International Conference on the problems of human environment, on which the United Nations General Assembly is going to decide

Recommends that in its deliberations, the United Nations General Assembly might:

1. Take into consideration the recommendations of the Conference on the biosphere, and

2. Consider the advisability of a Universal Declaration on the Protection and Betterment of the Human Environment.

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Biosphere Conference

RECOMMENDATION 18

TECHNICAL ASSISTANCE FOR BASIC AND APPLIED STUDIES ON THE RESOURCES OF THE BIOSPHERE

The Conference,

Considering that the resources of the biosphere are imperfectly known, especially in developing countries, and that this lack of knowledge also applies to the rapid changes that are taking place in the biosphere as a result of man's activities;

Recommends that all Member States, with the assistance of the United Nations Organizations, and other national, regional or international organizations, give immediate consideration to ways and means for applying more effort to increase basic and applied knowledge of the resources of the biosphere, particularly in the developing countries, in the interest of mankind as a whole, so that the rational use and conservation of the biosphere may be everywhere founded on a sound scientific basis;

Further recommends that better mechanisms be devised to increase the effectiveness of bilateral and multilateral assistance to enable the temporary release of experienced scientists from developed to developing countries and that developed countries be urged to improve their procedures towards this goal.

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Biosphere Conference

RECOMMENDATION 19

RATIONAL USE AND CONSERVATION IN ASSISTANCE PROJECTS FOR DEVELOPING COUNTRIES

The Conference,

Considering that developing countries cannot promote their socio-economic development without making rational use of their natural renewable and non-renewable resources;

Noting that agricultural, livestock, fishery and forest production which form the basis of the economic growth of these countries should increase at the high rate demanded by the demographic expansion and by the necessity to improve the living standard of the population;

Considering also the great hopes raised in many of these countries by regional associations for the common use of resources of river basins where the integrated management through dam constructions should develop irrigated agriculture, assure the needs of navigation and supply energy to industrial complexes;

Fearing, on the other hand, that intensive exploitation of the natural resources of these countries, and the necessary developments of industrialization could cause irreversible perturbations in an environment which is still little disturbed and whose balance is fragile;

Taking into account the shortage of human, material and financial means faced by these countries to successfully manage their environment and harmonize the goals of their development with the needs of conservation, in accordance with scientific basis;

The Conference recommends:

1. That pre-investment projects of governments of developing countries carried out by United Nations Specialized Agencies with financial help from the UNDP, should take adequate account of all the recommendations made by the Conference concerning the nature of projects, the choosing of experts, the awarding of fellowships, and the supplying of equipment, and that this also applies to investments financed by loans through the World Bank;

2. That ecological interactions should duly be taken into account in all large-scale development projects;

3. That international organizations, especially the UNDP and the World Bank should not hesitate to draw the attention of governments to these long-term concerns when elaborating their requests for assistance;

4. That these same organizations should take the necessary steps so that regional projects involving several countries, receive particular attention and that the mechanisms for their implementation be simplified as much as possible;

5. That, in relation to development programmes, these same organizations should dedicate all the necessary consideration to problems of research, education and creation of institutions.

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Biosphere Conference

RECOMMENDATION 20

PREPARATION OF AN INTERGOVERNMENTAL INTERDISCIPLINARY PROGRAMME

The Conference,

Conscious of the importance and urgency of the environmental problems existing in both the developed and in the developing countries;

Recognizing that a considerable amount of knowledge already exists which, if used judiciously, would enable a big advance to be made towards the solution of many problems;

Recognizing, too, that new knowledge is essential on a world-wide scale, as is also an enormous effort to promote education and to establish national structures and institutions in all countries;

Recognizing that in the biological sciences several non-governmental organizations, and particularly IBP and IUCN, have established networks of scientists who are now studying certain aspects of rational utilization and conservation of biological resources;

Recognizing likewise that these networks of scientists have developed widely and cannot make further progress without governmental and intergovernmental support;

Recommends that a plan for an international and interdisciplinary programme on the rational utilization and conservation of the resources of the biosphere be prepared for the good of mankind - a programme which should be carried out on an intergovernmental basis, with the participation of the non-governmental organizations required;

Recommends that this programme concentrate on the scientific, technical and educational aspects of the problems involved in the rational utilization and conservation of the resources of the biosphere and in the improvement of the human environment;

Recommends that Unesco, in consultation with the other organizations of the United Nations system and the non-governmental organizations concerned, initiate the necessary measures during the 1969-1970 biennium to review the existing situation and to make proposals to Member States with a view to the launching of a long-term programme in 1971-1972, thereby making provision for a follow-up and adequate extension of the International Biological Programme and for additional work on the part of the various United Nations institutions and non-governmental organizations;

Recommends that proposals be worked out with a view to setting up adequate coordination machinery for this programme, which will allow for concerted action by Member States, United Nations organizations and non-governmental organizations.